

THE THELEPHORACEÆ OF NORTH AMERICA. II¹

CRATERELLUS

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CRATERELLUS

Craterellus Pers. Myc. Eur. 2:4. 1825.—Fries, Epicr. 531. 1838; Hym. Eur. 630. 1874.—Saccardo, Syll. Fung. 6:514. 1888.—Hennings, in Engl. & Prantl, Nat. Pflanzenfam. (1. 1**): 127. 1898.

The type species of the genus is *Craterellus cornucopioides* L. ex Pers.

Fructifications fleshy or membranaceous, pileate, often tubiform, infundibuliform, or flabelliform, sometimes clavate; hymenium waxy-membranous, distinct, continuous, adnate to the hymenophore, even or rugose; basidia simple; spores usually white.

Craterellus is closely related by its fleshy *C. Cantharellus*, *C. odoratus*, *C. lutescens*, etc., with the genus *Cantharellus*. These species resemble so closely in coloration and habit species of the latter genus that careful examination of the hymenium should be made for generic determination. *Craterellus* has its hymenium even or slightly rugose. In exceptional connecting species, such as *C. clavatus*, it is somewhat lamelliform for a part of the distance from margin of the pileus to the stem. The clavate *C. pistillaris* and *C. unicolor* connect *Craterellus* closely with *Clavaria*.

Craterellus cornucopioides, *C. ochrosporus*, *C. clavatus*, *C. Cantharellus*, and *C. odoratus* are edible species, which are often abundant locally.

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NOTE.—Explanation in regard to the citation of specimens studied is given in Part I, Ann. Mo. Bot. Gard. 1: 202, footnote. The technical color terms used in this work are those of Ridgway, Color Standards and Nomenclature. Washington, D. C., 1912.

KEY TO THE SPECIES

- Hymenium somewhat radiately lamelliform—at least near the margin;
stem solid..... 1
- Hymenium plane, rugose-wrinkled, or ribbed and rugose-wrinkled..... 2
1. Fructification large, 4–10 cm. high; stem about 1 cm. thick; spores 10–13 x
4–4½ μ 1. *C. clavatus*
1. Fructification small, 1–1½ cm. high; stem 1 mm. thick; pileus umbilicate;
spores 9 x 7 μ 11. *C. delitescens*
2. Fructification with pileus infundibuliform and pallid rose; hymenium
and stem white. In N. Carolina in moss near *Kalmia* bushes.... 4. *C. roseus*
2. Fructification entirely egg-yellow, about 3–9 cm. high, 2½–9 cm. broad... 3
2. Fructification neither entirely egg-yellow nor with pileus pallid rose and
hymenium and stem white..... 4
3. Pileus convex, then depressed or infundibuliform; stem solid... 2. *C. Cantharellus*
3. Pileus convex, then depressed or cyathiform; stem hollow or cavernous;
fructification sometimes branched..... 3. *C. odoratus*
4. Pileus tubiform with cavity extending nearly or quite to the base of
the stem..... 5
4. Pileus not tubiform, but instead infundibuliform, depressed, truncate,
convex, or flabelliform..... 6
5. Pileus and stem smoky brown to blackish; hymenium cinereous drab; spores
12–16 x 6–10 μ 5. *C. cornucopioides*
5. Pileus drying avellaneous to snuff-brown; stem black with chamois-colored
pubescence at its base; hymenium chamois-colored or colored like the pileus;
spores 12–15 x 7–8 μ 6. *C. ochrosporus*
5. Pileus somewhat tubiform; hymenium dark cinereous; spores 6–7½ x 4½–5 μ
7. *C. dubius*
5. Pileus somewhat tubiform or umbilicate, yellowish brown to fuscous; hyme-
nium and stem yellow; spores 10–12 x 6–8 μ 8. *C. lutescens*
6. Pileus infundibuliform, 2–3 cm. broad; hymenium pallid cinereous;
spores 10–12 x 6–7 μ 9. *C. sinuosus*
6. Pileus deeply cup-shaped, 4–8 mm. broad; hymenium cream-buff;
spores 8 x 6 μ 10. *C. calyculus*
6. Pileus convex, then umbilicate, 5 mm. broad; hymenium sometimes
obscurely lamelliform, chamois-colored; stem chamois-colored; spores
9 x 7 μ 11. *C. delitescens*
6. Pileus merely depressed, truncate, convex, or clavate..... 7
6. Pileus flabelliform..... 8
7. Fructification small, 1–3 cm. high, 4–9 mm. broad, narrowly obconic, white;
spores 3–4 μ in diameter..... 12. *C. taxophilus*
7. Fructification 2–5 cm. high, from obconic often becoming abruptly enlarged
and somewhat cerebriform at the upper end but with the stem remaining
comparatively slender..... 13. *C. unicolor*
7. Fructification large, 6–15 cm. high, clavate or obconic and truncate, tapering
downward; stem often bulbous at the base. Fructification dries sorghum-
brown to fuscous..... 14. *C. pistillaris*
8. Pileus ligulate at first, then spreading laterally and becoming somewhat
palmately cleft into a few branches, fawn-color shading into bone-
brown. Known from Ohio..... 15. *C. palmatus*

8. Pileus somewhat triangular, drying a dirty pinkish buff; hymenium drying Isabella-color to clay-color. Known only from Florida. .16. *C. dilatus*
8. Fructification entirely white; pileus reniform, dimidiate, attached laterally to a slender erect stem. Known only from Washington
17. *C. Humphreyi*

1. *Craterellus clavatus* Pers. ex Fries, Epicr. 533. 1836–1838. Plate 15. fig. 6.

Merulius clavatus Pers. Obs. Myc. 1: 21. 1896.—*Cantharellus clavatus* Fries, Syst. Myc. 1: 322. 1821.—*Nevrophyllum clavatum* Fries ex Patouillard, Tab. Anal. Fung. 1: 193. f. 434. 1883–1886.—*Cantharellus brevipes* Peck, Rep. N. Y. State Mus. 33: 21. pl. 1. f. 18–20. 1879.

Illustrations: Schæffer, Icon. Fung. pl. 164, 276.—Krombholz, Abbild. und Beschr. pl. 45. f. 13–17.—Fries, Sverig. Ätl. Svamp. pl. 91.—Richon et Roze, Atlas Champ. pl. 50. f. 10–14.—Bresadola, Funghi Manger. pl. 82.—Peck, Rep. N. Y. State Mus. 33: pl. 1. f. 18–20.—Harper, Mycologia 5: pl. 93, 94.

Fructifications solitary or cespitose, fleshy, flesh whitish; pileus narrowly obconic, turbinate, truncate or depressed, glabrous, ochraceous buff, attenuated into the stem, the margin thin and erect; stem short, solid, tomentose at the base; hymenium lamelliform near the margin, rugose-wrinkled elsewhere, becoming pruinose with the spores, light vinaceous drab, drying drab; spores pale ochraceous in the mass, 10–13 x 4–4½ μ.

Fructifications 4–10 cm. high; pileus 3–8 cm. broad; stem 1–2 cm. long, 8–15 mm. thick.

On the ground in coniferous woods. Maine to Connecticut and west to Minnesota, and in Montana. July to September.

This species is intermediate between *Craterellus* and *Cantharellus*. The marginal portion of the hymenium is like that of a *Cantharellus*, and the remainder of the hymenium, like that of a *Craterellus*. There is good authority for including this species in *Cantharellus* and there is the authority of Fries and herbarium usage for classing it in *Craterellus*. *C. clavatus* is edible but too rare, at least in the east, to be common in herbaria.

Specimens examined:

Exsiccati: De Thuemen, Myc. Univ., 1807.

Austria: G. Bresadola.

Maine: Sprague (in Curtis Herb., 5786).

New Hampshire: Shelburne, *W. G. Farlow* (in *Mo. Bot. Gard. Herb.*, 4868).

Vermont: Lake Dunmore, *E. A. Burt*.

Connecticut: Rainbow, *C. C. Hanmer*, 1454 (in *Hanmer Herb.*).

New York: Ballston, *C. H. Peck*, the type of *Cantharellus brevipes* (in *Coll. N. Y. State*).

2. *C. Cantharellus* Schw. ex Fries, *Epicr.* 534. 1836–1838.
Plate 15. fig. 7.

Thelephora Cantharella Schw. *Schrift. d. Naturforsch. Gesell., Leipzig*, 1: 105. 1822.—*Craterellus lateritius* Berk. *Grevillea* 1: 147. 1873.

Illustrations: *Peck, Rep. N. Y. State Mus.* 49: *pl.* 44. *f.* 1–5; *Mem. N. Y. State Mus.* 34: *pl.* 56. *f.* 17–21.—*Hard, Mushrooms f.* 378.—*Marshall, Mushroom Book* 73. *f.*

Type: in *Herb. Schweinitz*.

Fructifications single or cespitose, fleshy, firm, egg-yellow; pileus convex, becoming depressed or infundibuliform, glabrous, yellow, the margin often lobed or irregular; stem solid, cylindric or tapering downward, glabrous, yellow; hymenium nearly even or rugose wrinkled, yellow, or with a reddish salmon tinge and drying ochre-red; spores 7–10 x 3½–5½ μ.

Fructifications 4–9 cm. high; pileus 2½–8 cm. broad; stem 2½–5 cm. long, 5–10 mm. thick.

On the ground in open woods. Massachusetts to Alabama and westward to Ohio; also in Mexico. June to September. Abundant locally.

This species is so similar to *Cantharellus cibarius* in habit, coloration, size and form—differing from the latter only in the more even hymenium, that figures of *C. cibarius* will serve very well for *Craterellus Cantharellus*, if allowance is made for the different hymenium. The firm and solid stem of *C. Cantharellus* distinguishes this species from *C. odoratus* easily. The latter species sometimes has its pileus greatly branched. My illustration of this species is photographed from the dried herbarium specimen of the cotype of *C. lateritius* Berk. In this specimen the lobes of the pileus were pressed together above before drying. The hymenium of this specimen is now ochre-red and agrees in color with that of the authentic specimen of *C. Cantharellus* in *Curtis Herb.*; both these specimens have been poisoned. I

found the spores of the type in Herb. Schw. 8-9 x $3\frac{1}{2}$ -4 μ , or a little slenderer than in northern specimens. Hard states that the spores are yellowish or salmon colored in the mass when collected. This species is edible.

Specimens examined:

Exsiccati: Ell. & Ev., N. Am. Fungi, 1921.

Massachusetts: *Sprague* (in Curtis Herb.); Milton, *H. Webster*.

Connecticut: East Hartford, *C. C. Hanmer*, 2391, 2468 (both in Hanmer Herb.).

Pennsylvania: West Chester, *B. M. Everhart*, Ell. & Ev., N. Am. Fungi, 1921.

West Virginia: Eglon, *C. G. Lloyd*, 02292.

North Carolina: *Schweinitz*, type (in Herb. Schweinitz); Blowing Rock, *G. F. Atkinson*, 4313.

South Carolina: Clemson College, *P. H. Rolfs*, 1830.

Alabama: *Peters* (in Curtis Herb., 4539, and in Kew Herb.), the cotype and type respectively of *C. lateritius*; Auburn, *F. S. Earle* (in Mo. Bot. Gard. Herb., 4928).

Ohio: *A. P. Morgan* (in Lloyd Herb.).

Kentucky: *C. G. Lloyd* (in Lloyd Herb.).

Mexico (?): *Botteri*, 27 (in Curtis Herb.). If the stem is hollow this specimen is *C. odoratus*.

3. *C. odoratus* Schw. ex Fries, Epicr. 532. 1836-1838.

Plates 15, 16. figs. 8-10.

Merulius odoratus Schw. Schrift. d. Naturforsch. Gesell., Leipzig, 1: 91. 1822.—*Cantharellus odoratus* Fries, Elenchus Fung. 1: 51. 1828.—*C. confluens* Berk. & Curtis, Jour. Linn. Soc. Bot. 9: 423. 1867.

Type: in Herb. Schweinitz.

Fructifications gregarious, sometimes cespitose, simple or branched, egg-yellow; pileus thin, convex, then depressed and somewhat cyathiform, sometimes pervious, yellow, the margin deflexed, often lobed or irregular; stem cylindric or somewhat tapering towards the base, concolorous with the pileus, hollow or cavernous; hymenium even or somewhat rugose-wrinkled, ochraceous orange or with a reddish tinge approaching Sanford's brown; spores even, 7-9 x 4-5 μ .

Fructifications 3-7 cm. high; pileus 2-9 cm. broad; stem 2-4 cm. long, 3-8 mm. thick.

In moist places in woods. North Carolina and Georgia to Ohio and Missouri. June to October.

Specimens of this species have sometimes been confused in recent years with the better known *C. Cantharellus*, which ranges farther north. The color and general habit of these species is the same; both have the egg-yellow color and the characteristic fragrance of *Cantharellus cibarius* when moistened after drying, and all three are edible. *Craterellus odoratus* is more membranaceous than *C. Cantharellus* and it differs from both this species and *Cantharellus cibarius* in having a hollow or cavernous stem whose pliant walls may be pinched together, like those of a rubber tube, before the specimens are dried. Highly branched forms may occur as shown in pl. 16 fig. 10a; this character was unduly emphasized in the original description. The ample collections in the Glatfelter Herbarium seem to show that *Craterellus odoratus* is the most frequent *Craterellus* in the vicinity of St. Louis. Dr. Glatfelter notes on his collection that he has eaten this species and found it quite good. In pl. 15 fig. 8, I give a figure, natural size, from a photograph of the dried herbarium cotype of *C. confluens* B. & C., to show how close the resemblance is to the specimens of *C. odoratus*, collected at St. Louis and figured in the following plate. The type of *C. confluens* has the hymenium rugose-wrinkled, as is often the case in specimens of *C. odoratus*; its habit, dimensions, structure, coloration, and spores are quite those of *C. odoratus*.

Specimens examined:

- North Carolina: Salem, *Schweinitz*, type (in Herb. Schweinitz).
 South Carolina: Society Hill, *Ravenel*, 192 (in Curtis Herb.).
 Georgia: Station cited by Schweinitz.
 Alabama: Auburn, *L. M. Underwood*.
 Ohio: Oxford, *L. O. Overholts*, 1721 (in Overholts Herb.).
 Missouri: near St. Louis, *N. M. Glatfelter*, 348 (in Mo. Bot. Gard. Herb., 42590), and *J. B. S. Norton* (in Mo. Bot. Gard. Herb., 4926).
 Mexico: near Orizaba, *Botteri*, 6 (type and cotype in Kew Herb. and Curtis Herb., respectively, of *C. confluens*).

4. *C. roseus* Schw. ex Fries, *Epicr.* 533. 1836-1838.

Merulius roseus Schw. *Schrift. d. Naturforsch. Gesell., Leip-*

zig, 1: 91. 1822.—*Cantharellus roseus* Fries, Elenchus Fung. 53. 1828.

Fructifications solitary, somewhat fleshy; pileus infundibuliform, somewhat strigose, pallid rose, the margin lobed and inflexed; stem apparently stuffed, attenuated downward, white; hymenium somewhat rugose, white.

In mosses, especially in proximity to *Kalmia*. North Carolina.

Specimens of this species have the habit of *Cantharellus cibarius* but are thinner. Fries received a specimen of *Craterellus roseus* from Schweinitz and expressed the opinion in 'Elenchus' that the species is good. I have seen no specimens of *C. roseus* and base the above on the original description and the comments by Schweinitz and Fries.

5. *C. cornucopioides* L. ex Pers. Myc. Eur. 2: 5. 1825.

Plate 17. fig. 17.

Peziza cornucopioides L. Sp. Pl. 1181. 1753. [1st ed.]—*Elvella cornucopioides* Scop. Fl. Carn. 2: 476. 1760.—*Merulius cornucopioides* Pers. Syn. Fung. 491. 1801.—*Cantharellus cornucopioides* Fries, Syst. Myc. 1: 321. 1821.

Illustrations: Vaillant, Botan. Paris. pl. 13. f. 2, 3.—Bolton, Hist. Fung. pl. 103.—Flor. Dan. pl. 384, 1260.—Holmskiöld, Fung. Dan. 2. pl. 5.—Sowerby, Brit. Fung. pl. 74.—Schæffer, Icon. Fung. pl. 165.—Bulliard, Herb. de la France pl. 150.—Schnizlein, in Sturm, Deutsch. Flora 3: fasc. 31. pl. 5.—Bresadola, Funghi Manger. 75. pl. 83.—Cooke, Brit. Edible Fung. pl. 11. f. 39.—Dufour, Atlas Champ. pl. 70. f. 157.—Hard, Mushrooms 451. f. 379.—Peck, Rep. N. Y. State Mus. 48: pl. 24. f. 7-10.—cf. Saccardo, Syll. Fung. 19: 478, for other references to illustrations.

Fructifications gregarious or somewhat cespitose; pileus thin, somewhat membranaceous, tubæform, pervious, sometimes granular or minutely squamulose, smoky brown to blackish, usually drying Prout's brown, with the erect, spreading, or decurved margin generally lobed, wavy, or irregular; stem short, hollow, even, blackish brown; hymenium even or rugose-wrinkled, cinereous drab; spores hyaline, even, 12-16 x 6-10 μ .

Fructification 5-8 cm. high; pileus 2½-5 cm. broad; stem 1-3 cm. long, 3-5 mm. thick.

On earth in mixed woods. Canada to South Carolina and westward to Missouri. June to September.

The cornucopia craterellus is well characterized by its cornucopia-shaped or narrowly trumpet-shaped pileus ashy to sooty brown in color, by thin flesh which is somewhat tough and flexile, cinereous drab hymenium which sometimes has a brownish tinge, and black stem. This species is too infrequent to afford more than a few herbarium specimens in the regions where I have collected fungi, but it is reported so plentiful in some states as to be highly regarded as an edible species.

Specimens examined:

Exsiccati: Ravenel, Fung. Car. II. 27; Ellis, N. Am. Fungi, 321; Ell. & Ev., Fung. Col., 1723; Shear, N. Y. Fungi, 49; Rabenhorst-Winter, Fung. Eur., 3640.

Sweden: *L. Romell*, 48.

Canada: *J. Macoun*, 72, 73.

Ontario: Casselman, *J. Macoun*, 347.

Vermont: Grand View Mt., *E. A. Burt*.

Massachusetts: *Sprague*, 211 (in Curtis Herb.).

Connecticut: *W. A. Setchell*.

New York: Sand Lake, *C. H. Peck* (in Coll. N. Y. State); Alcove, *C. L. Shear*, Shear's N. Y. Fungi, 49; Ithaca, *H. von Schrenk* (in Mo. Bot. Gard. Herb., 4763, 42584), *W. H. Long, Jr.*, Ell. & Ev., Fung. Col., 1723.

New Jersey: Newfield, *H. Leahy*, Ellis, N. Am. Fungi, 321.

Pennsylvania: locality cited by Schweinitz, Syn. N. Am. Fungi; *W. Herbst* (in Lloyd Herb.).

North Carolina: (in Curtis Herb., 502); locality cited by Schweinitz, Syn. Fung. Car. Sup.

South Carolina: *M. A. Curtis* (in Curtis Herb.).

Ohio: Loveland, *D. L. James*, comm. by U. S. Dept. Agr.

Kentucky: Mammoth Cave, *C. G. Lloyd*.

Missouri: Perryville, *C. H. Demetrio*, Rabenhorst-Winter, Fung. Eur., 3640; Meramec Highlands, *P. Spaulding* (in Mo. Bot. Gard. Herb., 4869).

6. *C. ochrosporus* Burt, n. sp. Plate 17. fig. 15.

An *C. ocreatus* Pers. Myc. Eur. 2: 5. pl. 13. f. 2. 1825?

Type: in Mo. Bot. Gard. Herb., 42585.

Fructifications gregarious or cespitose; pileus thin, somewhat

membranaceous, tubæform, pervious, minutely floccose-squamulose, drying avellaneous to snuff-brown, the margin erect or decurved; stem short, hollow, black, with chamois-colored pubescence at the base; hymenium even or somewhat rugose, sometimes colored like the pileus but in the type chamois-colored; spores straw-yellow in the mass, even, obtuse, 12–15 x 7–8 μ .

Fructifications 4–7 cm. high; pileus 1–3½ cm. broad, 1–2½ cm. long, 2–4 mm. thick.

On the ground among mosses in woods. New York and Missouri. June to September. Probably abundant in Missouri.

Dr. Glatfelter noted a pleasant minty odor for the specimens. This species closely resembles *C. cornucopioides* in form, but differs from that species in having hymenium, spores, and base of stem yellow. A collection from the same spot from which the type collection came, but made in June two years later, has the hymenium snuff-brown and approaches *C. cornucopioides* in this respect. I am not aware of any data on *C. ocreatus* Pers. except that based on the original description which is cited above. That species has presumably not been collected by European mycologists since the original collection from the environs of Paris a century ago. Our specimens differ from that description in having the stem yellow pubescent at the base and the hymenium somewhat rugose, and they may differ in other characters, e. g., spore colors, etc., not given in the brief description of *C. ocreatus*. Hence I give to our American specimens a distinct name.

Specimens examined:

New York: East Galway, *E. A. Burt*.

Missouri: Meramec Highlands, *N. M. Glatfelter* (in *Mo. Bot. Gard. Herb.*, 42585, type, and 42586–87); Columbia, *B. M. Duggar*, 134.

7. *C. dubius* Peck, *Rep. N. Y. State Mus.* 31: 38. 1879.

Illustrations: *Hard, Mushrooms f.* 380.

Type: in Coll. New York State.

Fructifications solitary or cespitose; pileus thin, infundibuliform or subtubiform, subfibrillose, dark brown or lurid brown, pervious, the margin generally wavy and lobed; stem short, hollow, colored like the hymenium; hymenium dark

cinereous and rugose when moist, the obscure crowded irregular wrinkles abundantly anastomosing, nearly even and paler when dry; spores broadly elliptical or subglobose, $6-7\frac{1}{2} \times 4\frac{1}{2}-5 \mu$.

Fructification $5-7\frac{1}{2}$ cm. high; pileus $2\frac{1}{2}-5$ cm. broad, 4 mm. thick.

On ground in woods. Ontario and New York to Illinois. August to October. Rare.

The specimens of this species have the same coloration as those of *C. cornucopioides* but differ from the latter in having a shorter and more funnel-shaped pileus, and smaller spores. Moffatt reported *C. dubius* as abundant at Glencoe, Illinois.

Specimens examined:

Ontario: Belleville, *J. Macoun*, 228 (in Coll. N. Y. State).

New York: Adirondack Mts., *C. H. Peck*, type (in Coll. N. Y. State).

Michigan: Sailor's Encampment, Univ. of Wis. Herb., 46.

8. *C. lutescens* Pers. ex Fries, Epier. 532. 1838.

Plate 17. fig. 20.

Merulius lutescens Pers. Syn. Fung. 489. 1801; Albertini & Schweinitz, Consp. Fung. 234. 1805.—*Cantharellus lutescens* Fries, Syst. Myc. 1: 320. 1821.—*Merulius xanthopus* Pers. Myc. Eur. 2: 19. pl. 13. f. 1. 1825.

Illustrations: Vaillant, Botan. Paris. pl. 11. f. 9, 10.—Schæffer, Icon. Fung. pl. 157.—Bolton, Hist. Fung. pl. 105. f. 2.—Persoon, Myc. Eur. 2: pl. 13. f. 1.—Hennings, in Engl. & Prantl, Nat. Pflanzenfam. (1.1**): 129. f. 70 H.—Stevenson, Brit. Hym. 2: 259.

Fructifications solitary to cespitose; pileus thin, somewhat membranaceous, varying from convex and umbilicate to tubiform or funnel-shaped, often pervious, yellowish brown to fuscous, with margin often lobed or irregular; stem flexuous, cylindric, hollow, yellow, drying ochraceous buff, often hairy at the base; hymenium remotely ribbed, even or rugose-wrinkled, yellow, drying cadmium-yellow to ochraceous buff; spores even, $10-12 \times 6-8 \mu$.

Fructifications $2\frac{1}{2}-5$ cm. high; pileus $1\frac{1}{2}-3$ cm. broad, stem $1\frac{1}{2}-4$ cm. long, 2-4 mm. thick.

On moist ground in woods and swamps. Newfoundland to North Carolina and westward to Michigan. August to October.

This species probably ranks next to *C. cornucopioides* in frequency in the United States. The long and yellow stem readily distinguishes this species from *C. ochrosporus*. Specimens of *Cantharellus infundibuliformis* resemble those of *Craterellus lutescens* in form, size, and color, but those of the former species have true lamellæ.

Specimens examined:

Exsiccati: Ellis, N. Am. Fungi, 1302; De Thuemen, Myc. Univ., 404.

Sweden: Stockholm, *L. Romell*, 49; Femsjö, *L. Romell*.

Newfoundland: Bay of Islands, *A. C. Waghorne*, 34 (in Mo. Bot. Gard. Herb.).

New Hampshire: Shelburne, *W. G. Farlow*, Ellis, N. Am. Fungi, 1302, and (in Mo. Bot. Gard. Herb., 4932).

Vermont: Lake Dunmore, *E. A. Burt*.

Massachusetts: Worcester, *G. E. Francis*, 100.

New England: *Sprague*, 1689 (in Curtis Herb.).

New York: Sand Lake and Helderberg Mts., *C. H. Peck* (in Coll. N. Y. State); East Galway, *E. A. Burt*.

Pennsylvania: locality cited by Schweinitz, Syn. N. Am. Fungi.

North Carolina: locality cited by Schweinitz, Syn. Fung. Car. Sup.

Michigan: Glen Lake, *C. G. Lloyd*, 02462.

9. *C. sinuosus* Fries ex Fries, Epicr. 533. 1836-1838.

Cantharellus sinuosus Fries, Syst. Myc. 1: 319. 1821.

Illustrations: Vaillant, Botan. Paris. pl. 11. f. 11-23.—Fries, Icon. Hym. 2: pl. 196. f. 2.—Dangeard, Le Botaniste 4: 147. f.—Gillet, Champ. France Hym. pl.

Fructifications cespitose, slightly fleshy; pileus infundibuliform, undulate and floccose, light drab; stem cylindric, stuffed, pallid cinereous; hymenium at length with interwoven wrinkles, pallid cinereous; spores 10-12 x 6-7 μ .

Fructifications 2-3 cm. high; pileus 2-3 cm. broad; stem 1½-2 cm. long, 2-4 mm. thick.

On ground in mixed woods. South Carolina. Rare.

I have seen only dried herbarium specimens of *Craterellus sinuosus*. The spore measurements are those of a specimen from Sweden received from Romell. In this specimen the hymenium has dried somewhat chamois-colored.

Specimens examined:

Exsiccati: Rabenhorst, Fung. Eur., 208 (in Kew Herb.).

Sweden: *L. Romell*, 50.

South Carolina: *Ravenel* (in Curtis Herb., 2982).

C. crispus Fr., sometimes regarded as a variety of *C. sinuosus*, was reported from New England, *Sprague*, by Berkeley & Curtis, *Grevillea* 1: 147, but the specimen is not satisfactory for study. I do not, therefore, like to include *C. crispus* as one of our species.

10. ***C. calyculus*** (B. & C.) Burt, n. comb.

Stereum calyculus Berk. & Curtis, Hooker's Jour. Bot. and Kew Gard. Misc. 1: 238. 1849; *Grevillea* 1: 161. 1873.

Type: type and cotype in Kew Herb. and Curtis Herb. respectively.

Fructifications somewhat fleshy-membranaceous; pileus thin, deeply cup-shaped, minutely tomentose, drying Saccardo's umber, opaque; stem apparently hollow, cream buff, attenuated below, tomentose at the base; hymenium even or slightly venose, cream buff; spores slightly yellowish under the microscope, even, $8 \times 6 \mu$.

Fructifications 2-3 cm. high; pileus 4-8 mm. broad; stem 1 cm. long, 1-2 mm. thick.

On ground in damp shady woods. North and South Carolina. August and September.

Upon moistening, the type in Kew Herbarium proved too soft and fleshy and the hymenium too waxy for a *Stereum*. The sections have the structure of *Craterellus*. The species is near *C. sinuosus* and may prove to be a small form of this when ample material gives more complete knowledge of the species, but, for the present, I regard *C. calyculus* as a distinct species. I refer to *C. calyculus* a collection made by Professor Atkinson at Blowing Rock, North Carolina, the rough-dried and cespitose specimens of which show a somewhat tubiform pileus and spores $7-8 \times 4\frac{1}{2} \mu$.

Specimens examined:

North Carolina: Blowing Rock, *G. F. Atkinson*, 4200.

South Carolina: Santee River, *Ravenel*, Curtis Herb., 1716 (the type and cotype in Kew Herb. and Curtis Herb. respectively).

11. *C. delitescens* Burt, n. sp.

Plate 17. fig. 18.

Type: in Burt Herb.

Fructifications gregarious, cespitose, somewhat fleshy; pileus thin, convex, then umbilicate, dry, fibrillose, sepia-colored, the margin inrolled; stem equal, solid, glabrous, chamois-colored; hymenium even or sometimes obscurely lamelliform, chamois-colored; spores white, even, broadly ovoid, $9 \times 7 \mu$, borne four to a basidium.

Fructification 10–15 mm. high; pileus 5 mm. broad; stem 10–15 mm. long, 1 mm. thick.

Growing among mosses on very thin soil on rocks by waterfall. Vermont. August.

This species is intermediate between *Cantharellus* and *Craterellus* in its hymenial structure, but, as some of the specimens have the hymenium even and bearing mature spores, I include the species in *Craterellus*. The specimens are much smaller than those of *C. calyculus* and have the pileus becoming merely umbilicate. The little fructifications were well concealed among the mosses; I have found them but once.

Specimens examined:

Vermont: Falls of Lana, Lake Dunmore, *E. A. Burt*, type.

12. *C. taxophilus* Thom, Bot. Gaz. 37: 215–19. f. 1–8. 1904.

Plate 17. fig. 21.

Illustrations: Thom, *ibid.* f. 1–8.

Type: in Cornell Univ. Herb., 15445.

Fructifications single, rarely gregarious, fleshy-membranaceous, entirely white when young, becoming pallid to ochraceous buff with age, drying cinnamon buff; pileus narrowly obconic, slightly viscid, the apex truncate, plane, or depressed and with a thin margin which is erect or expanded; stem solid, equal or tapering downward, flexuous, pruinose, with scattered white hairs at the base; hymenium even, becoming longitudinally rugose-wrinkled with age or upon drying; spores white, even, subglobose, $3\text{--}4 \mu$ in diameter, borne four to a basidium.

Fructifications 1–3 cm. high; pileus 4–9 mm. broad; stem $\frac{1}{2}$ –2 cm. long, $\frac{1}{2}$ –1 mm. thick.

On rotten twigs and leaves under prostrate branches of *Taxus canadensis*. New York. October and November.

This delicate fungus was under observation by Dr. Thom

for a month and is described in detail and beautifully illustrated in connection with his original description in the work cited above. I reproduce merely some simple outline sketches of *C. taxophilus*; this is a very distinct species. The specimens were found in Fall Creek Gorge and nowhere except under prostrate branches of *Taxus*, yet they grew on rotting twigs and leaves of other species as well as on pieces of *Taxus*.

Specimens examined:

New York: Ithaca, *C. Thom*, Cornell Univ. Herb., 15445.

13. *C. unicolor* Rav. *Grevillea* 1: 148. 1873.

Plate 16. fig. 11, 12.

C. corrugis Peck, Bull. Torr. Bot. Club 26: 69. 1899.

Type: in Ravenel, Fung. Car. II. 26.

Fructifications solitary or cespitose, fleshy, with the flesh white, soft, soon shrinking and leaving the pileus hollow; pileus at first clavate, obtuse, flesh-colored tinted with violet, soon obconic or turbinate, broadly convex or truncate, and often abruptly cerebriform at the upper end, glabrous, ochraceous buff, drying Rood's brown to Natal-brown, the margin obtuse, corrugated by the hymenial wrinkles; stem short, equal or tapering downwards, colored like or a little paler than the pileus; hymenium wrinkled or corrugated, colored like the pileus; spores white, 8-12 x 4-6 μ .

Fructifications 2-5 cm. high; pileus 1½-5 cm. broad; stem 1-2½ cm. long, 5-8 mm. thick.

On ground in thin woods. Massachusetts, Pennsylvania, and South Carolina. October to January.

This fungus presents strikingly the vagaries in the distribution of fungi. It was originally collected at Black Oak, South Carolina, in 1850, by Ravenel, in sufficient quantity so that he distributed the type collection in his exsiccati. Apparently, this fungus, whenever collected, was referred to other species until 1898, when members of the Boston Mycological Club found it in several localities in Massachusetts and it was adequately described by Peck, as *C. corrugis*, from specimens received from Dr. Francis. I have received no specimens of this species since that season; I searched for it in vain for several years in the adjoining state, Vermont. I have compared the specimens of *C. corrugis*, received from Dr. Francis, with Peck's

type and with the specimens of *C. unicolor* in five different copies of Ravenel's 'Fungi Caroliniani.' *C. corrugis* is certainly the same species as *C. unicolor*. It is very strange that in the interval of nearly half a century from the time of the original collection, *C. unicolor* did not attract attention from an intermediate station.

Specimens examined:

Exsiccati: Ravenel, Fung. Car. II. 26; Ell. & Ev., N. Am.

Fungi, 1922a under the name *C. pistillaris*.

Massachusetts: Worcester, *G. E. Francis*, 61, 84, and collection dated Nov. 2, also the type (in Coll. N. Y. State) of *C. corrugis*; Lynn, *H. Webster*; Medford, *Mrs. Page and Mrs. De Long*, ex Herb. Boston Mycological Club, 420; Arlington Heights, *E. A. Burt*.

Pennsylvania: Trexlertown, *W. Herbst*, the *C. clavatus* of his 'Fungal Flora'; West Chester, *B. M. Everhart*, Ell. & Ev., N. Am. Fungi, 1922a.

South Carolina: Black Oak, *Ravenel*, 1406 (in Curtis Herb. and in Kew Herb.), and type, Ravenel, Fung. Car. II. 26.

14. *C. pistillaris* Fries, Epicr. 534. 1836-1838.

Plates 16, 17. figs. 13, 14.

Illustrations: Schæffer, Icon. Fung. pl. 169.—Harper, Mycologia 5: 263. pl. 95.

Fructifications gregarious, fleshy-spongy, drying sorghum-brown to fuscous; pileus somewhat clavate to turbinate or narrowly obconic, truncate, or somewhat convex, at first yellowish cinnamon, then becoming tinged with fuscous, the edge obtuse; stem solid, paler than the pileus, often bulbous at the base; hymenium corrugated and rugose-wrinkled, colored like the pileus, drying sorghum-brown to fuscous; spores even, 10-12 x 6-8 μ .

Fructifications 6-12 cm. high; pileus 2-3½ cm. broad; stem 3-6 cm. long, 4-12 mm. thick.

On ground in woods under coniferous trees. New Hampshire, Vermont, and Michigan. August to October.

Specimens of this species have so nearly the coloration of *C. unicolor* that those, small and undeveloped, in a collection of *C. pistillaris* cannot readily be distinguished from partially developed specimens of *C. unicolor*; but with age, those of *C.*

unicolor—or at least some of them—have the pileus enlarge abruptly in diameter near the upper end and become abruptly globose-cerebriform on a slender stem, as shown in figs. 11 and 12, while *C. pistillaris* increases in length as well as in diameter, tapers downward more uniformly from the truncate upper end, and may have the stem bulbous at the base.

It is a vexed question with mycologists whether *Craterellus pistillaris* Fr. is *Clavaria pistillaris* L. The specimens which I refer to *Craterellus pistillaris* agree well with specimens of this species in Curtis Herbarium, collected at Upsala, Sweden, in 1853, and communicated by E. P. Fries. Pl. 16 fig. 13 is from a photograph, natural size, of these specimens. Their spores are $9 \times 6 \mu$. The Friesian specimens have the same dark color as our American specimens. Only one of the former shows a bulbous tendency at the base of the stem; in this respect our specimens are more like the illustration of Schæffer, cited above. I believe, therefore, that we have *Craterellus pistillaris* Fr. in our flora. I have collected in mixed frondose woods in Missouri what I refer to *Clavaria pistillaris* as understood by European mycologists. As compared with the former species it is of softer structure, much paler in color, more regularly clavate in form, sometimes splitting at the apex. The illustrations of most European authors agree well in regard to *Clavaria pistillaris*. The colored figures of this species in Batsch, Bulliard, Sturm, Dufour, Flora Danica, Hussey, Krombholz, Quelet, and Sowerby present fructifications of the same habit and bright coloration which we have by Peck, Bull. N. Y. State Mus. 94: pl. 93. f. 1-4. and Mem. N. Y. State Mus. 4: pl. 66. f. 15-17.

Specimens examined:

Sweden: Upsala, E. P. Fries (in Curtis Herb.).

Austria: G. Bresadola.

New Hampshire: Shelburne, W. G. Farlow (in Mo. Bot. Gard. Herb., 4933).

Vermont: Middlebury, E. A. Burt.

15. *C. palmatus* Burt & Overholts, n. sp. Plate 17. fig. 19.

Type: in Mo. Bot. Gard. Herb. and in Overholts Herb.

Fructifications gregarious or perhaps cespitose, fleshy-soft; pileus fawn-color shading into bone-brown towards the stem,

glabrous, flattened and ligulate at first, then spreading out laterally at the apex, and at length somewhat palmately cleft into 2-12 unequal, obtuse, finger-shaped branches; stem curved, solid, equal or somewhat tapering towards the base, bone-brown, sometimes swollen where attached to the substratum; hymenium even or but slightly venose, inferior, colored like the pileus; spores white, even, pyriform, tapering to the base, $6-8 \times 3-4 \mu$.

Fructifications $1-2\frac{1}{2}$ cm. high; pileus 3-15 mm. broad, 1 mm. thick; stem 8-15 mm. long, $1-1\frac{1}{2}$ mm. thick.

On rotten chunks of wood in frondose woods. Ohio. June.

All specimens of the collection except one have the pileus flabelliform; in this exceptional specimen, the pileus is narrowly turbinate, depressed, and with the finger-shaped branches arranged in a circle on the margin, pl. 17 fig. 19b. This species makes for *Craterellus* the same connection between the central-stemmed, cup-shaped type of pileus and the flabelliform type that *Thelephora multipartita* shows in *Thelephora*, and that is common in *Stereum*. The hymenium of the flabelliform specimens of *Craterellus palmatus* is so similar to the upper surface of the pileus in color and consistency that one cannot readily distinguish between these surfaces in the dried specimens. For these reasons, the present species cannot be referred to either *Skepperia* or *Friesula*, and it is of especial interest in showing that *Craterellus* has a natural section of species with flabelliform pileus. The spores of *C. palmatus* are noteworthy.

Specimens examined:

Ohio: Oxford, *L. O. Overholts*, 1649, type (in Mo. Bot. Gard. Herb. and in Overholts Herb.).

16. *C. dilatus* Burt, n. sp.

Plate 17. fig. 16.

Type: in Farlow Herb.

Fructifications single, fleshy; pileus flabelliform, somewhat triangular, glabrous, drying a dirty pinkish buff, the margin somewhat irregularly lobed, crisped, and curving upward; stem solid, equal, flexuous, drying Natal-brown, with white mycelium at the base; hymenium even, drying Isabella-color to clay-color; spores white, even, broadly ovoid, obtuse, $8-10 \times 6-7 \mu$.

Dried fructification 4 cm. long; pileus 15 mm. long, 15 mm. broad, $\frac{1}{2}$ mm. thick; stem $2\frac{1}{2}$ cm. long, hardly 1 mm. thick.

On sandy ground in swamp. Florida. September.

Only a single fructification was collected; the description is based upon this dried specimen. The species is distinguished by its fan-shaped, triangular pileus and the comparatively long and slender stem. Its characters are those of a true *Craterellus* and yet such that we cannot regard it as a flabellate form of any other species.

Specimens examined:

Florida: Sorrento Swamp, *R. Thaxter*, type (in Farlow Herb.).

17. *C. Humphreyi* Burt, n. sp. Plate 17. fig. 22.

Type: in Burt Herb. and in Humphrey Herb.

Fructifications gregarious, fleshy, moderately tough and flexible, entirely white, usually with the pileus standing out horizontally at the apex of the erect stem; pileus reniform, dimidiate, sometimes clasping behind, convex, becoming plane or somewhat depressed, usually even, dry, minutely pubescent, the margin entire, even or slightly crisped; stem lateral, erect, often bent at right angles just before joining the pileus, cylindrical below, equal, solid, pubescent; hymenium nearly even, sometimes radiately venose near the stem, brittle when fresh; spores white, even, subglobose, $3\frac{1}{2}$ – $4\frac{1}{2}$ x $3\frac{1}{2}$ μ .

Fructifications 3–7 cm. high; pileus 6 mm. – 2 cm. long, 1– $3\frac{1}{2}$ cm. broad, $\frac{3}{4}$ mm. thick; stem $2\frac{1}{2}$ –6 cm. long, 2 mm. thick.

On humus and among mosses in low swampy thicket. Washington. October.

The habit of this curious species is very suggestive of *Hydnum auriscalpium*; many of the specimens have the erect stem bent at right angles near the apex so that the pileus extends out in a horizontal plane. Sometimes the stem branches at its upper end and bears two pilei. The pubescence on the stem is rather coarse and is most abundant towards the base. All parts of the fructification were rather brittle in vegetative condition, and broke when bent too far. It is a connecting species between *Craterellus* and *Arrhenia*, but with the hymenium rather too even for *Arrhenia*, in my opinion.

Specimens examined:

Washington: Hoquiam, *C. J. Humphrey*, 1886, type.

Berkeley & Curtis, Jour. Linn. Soc. Bot. **10**: 328, described three species of *Craterellus* from Cuba, which have been transferred to other genera by Patouillard, Bull. Soc. Myc. France **15**: 193-94. pl. 9, as follows: *C. spathularius* to *Skepperia* and *C. marasmioides* and *C. pulverulentus* to *Cymatella*. I have received no collections referable to these genera and defer their consideration to the final part of my monograph in the hope that some specimens may be received in the meantime.

Craterellus canadensis Kl. ex Saccardo, Syll. Fung. **6**: 519. 1888, was published by Berkeley, Ann. Nat. Hist. **3**: 380. 1839, under the name *Cantharellus canadensis* Kl. from a specimen in Hooker Herb. bearing manuscript notes by Klotzsch. The specimen was collected in Canada by Richardson. In connection with the original description, Berkeley noted that the nearest affinities of *C. canadensis* are with *C. clavatus*. In 1856, after studying the specimens in Herb. Schweinitz, Berkeley & Curtis, Jour. Acad. Nat. Sci., Phila. N. S. **3**: 206. 1856, note that *Cantharellus canadensis* Kl. is apparently the same species as *Cantharellus floccosus* Schw. I have seen no specimens of *C. canadensis* and follow Berkeley's final disposition of the species.

(To be continued.)

EXPLANATION OF PLATE

PLATE 15

All figures of this plate have been reproduced natural size from photographs of dried herbarium specimens.

Fig. 1. *Thelephora caespitulans*. From authentic specimen in Curtis Herb., collected by Schweinitz in North Carolina.

Fig. 2. *T. lutosa*. From authentic specimen in Curtis Herb., collected by Schweinitz in North Carolina.

Fig. 3. *T. dentosa*. From cotype in Curtis Herb., collected in Cuba by C. Wright.

Fig. 4. *T. perplexa*. From type in Curtis Herb., collected in Cuba by C. Wright, 238. *a* shows a resupinate portion, and *b*, an ascending portion of the specimen.

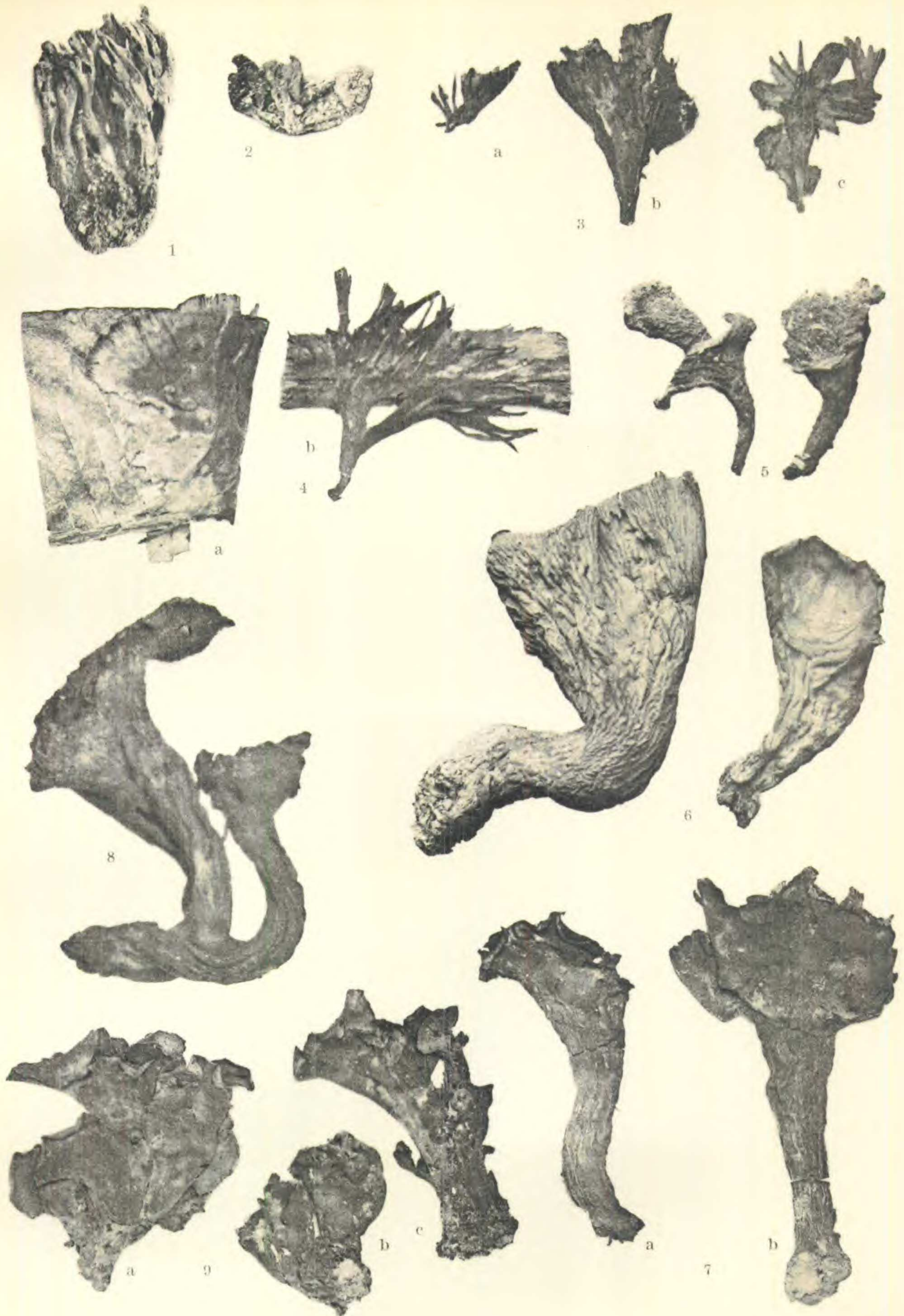
Fig. 5. *T. cornucopioides*. From specimen collected in Castleton Gardens, Jamaica, by F. S. Earle, 238.

Fig. 6. *Craterellus clavatus*. From specimen collected at Lake Dunmore, Vt.

Fig. 7. *C. Cantharellus*. From the cotype in Curtis Herb., 4539, of *C. lateritius*, collected in Alabama, by Peters.

Fig. 8. *C. odoratus*. From the cotype in Curtis Herb. of *C. confluens*, collected near Orizaba, Mexico, by Botteri, 6.

Fig. 9. *C. odoratus*. From the specimens in Curtis Herb., collected at Society Hill, S. Carolina, by Ravenel, 192.



BURT—THELEPHORACEAE OF NORTH AMERICA

1. THELEPHORA CAESPITULANS.—2. T. LUTOSA.—3. T. DENTOSA.—4. T. PERPLEXA.—5. T. CORNUCOPIOIDES.—6. CRATERELLUS CLAVATUS.—7. C. CANTHARELLUS.—8 AND 9. C. ODORATUS.

EXPLANATION OF PLATE

PLATE 16

All figures of this plate have been reproduced natural size from photographs of dried herbarium specimens, but in the case of fig. 10 the specimens were moistened.

Fig. 10. *C. odoratus*. From specimens collected near St. Louis, Mo., by N. M. Glatfelter, 348. The rough dried specimens were moistened before being photographed. *a* shows a branched specimen; *b*, a fructification split longitudinally to show extent of depression of the pileus and the hollow stem; *c*, view of hymenium.

Fig. 11. *C. unicolor*. From authentic specimen in Curtis Herb., collected at Black Oak, S. Carolina, by Ravenel, 1406.

Fig. 12. *C. unicolor*. From specimen of *C. corrugis* collected at Medford, Mass., by Mrs. Page and Mrs. DeLong.

Fig. 13. *C. pistillaris*. From specimen in Curtis Herb., collected at Upsala, Sweden, by E. P. Fries.



BURT—THELEPHORACEAE OF NORTH AMERICA

10. CRATERELLUS ODORATUS.—11 AND 12. C. UNICOLOR.—13. C. PISTILLARIS.

EXPLANATION OF PLATE

PLATE 17

All figures are natural size. Figures 14-20 are from photographs of dried herbarium specimens, but which were moistened before being photographed in case of specimens used for figs. 15 and 17.

Fig. 14. *C. pistillaris*. From specimen collected under hemlock (*Tsuga*) tree, at Middlebury, Vt.

Fig. 15. *C. ochrosporus*. From type specimens in Mo. Bot. Gard. Herb., collected near St. Louis, Mo., by N. M. Glatfelter, 1253. *a* is split longitudinally to show the depth of depression of the pileus; *b*, side view.

Fig. 16. *C. dilatus*. From type in Farlow Herb., collected at Sorrento Swamp, Florida, by R. Thaxter. *a* shows upper surface of pileus, and *b*, the hymenium.

Fig. 17. *C. cornucopioides*. From specimen collected in Canada, by J. Macoun, 72.

Fig. 18. *C. delitescens*. From type specimens collected at Lake Dunmore, Vt.

Fig. 19. *C. palmatus*. From type specimens in Mo. Bot. Gard. Herb. and Overholts Herb., collected at Oxford, Ohio, by L. O. Overholts, 1649. *a* shows specimens having flabelliform pileus, and *b*, a specimen with turbinate pileus.

Fig. 20. *C. lutescens*. *a* shows hymenium of specimen collected at Shelburne, New Hampshire, by W. G. Farlow, and *b*, upper surface of specimen collected at Lake Dunmore, Vt.

Fig. 21. *C. taxophilus*. From sketches of photographs of type specimens when in vegetative condition, collected at Ithaca, New York, by C. Thom.

Fig. 22. *C. Humphreyi*. From sketches of the type specimens when in vegetative condition, collected at Hoquiam, Wash., by C. J. Humphrey, 1386.